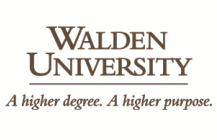

1-1-2011

The Effect of Class Size on Inclusion Student Academic Success

Anthony, III Arico
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COLLEGE OF EDUCATION

This is to certify that the doctoral study by

Anthony Arico

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

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2011

Abstract

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by

Anthony Arico III

M.S.E.D., Monmouth University, 2002

M.A.T., Monmouth University, 2000

B.S., West Virginia University, 1997

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Administrative Leadership for Teacher Learning

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Abstract

The No Child Left Behind Act (NCLB) of 2001 is based on the principle that setting high academic expectations and establishing measurable goals can improve individual outcomes in education. Under NCLB, states are required to develop assessments in basic skills to be given to all students in certain grades if those states are to receive federal funding for schools. The purpose of this study was to determine if reduced inclusion class sizes affect student's scores on the Assessment of Skills and Knowledge (ASK) test administered in one northeastern US state and to solicit teachers' opinions of smaller class sizes. Inclusions classes are those that enroll special needs students. Theoretical foundations guiding this study included social learning theory, constructivist theory, and the cooperative learning theory. The key question this study focused on was whether or not smaller class size has an effect on academic achievement for special needs inclusion students. Using archival data, this ex post facto study found a statistically significant difference using a MANOVA, $F(2,34) = 14.55$, $p < 0.0001$ for the research question investigating the effect class size has on special needs inclusion students. Positive social change implications include helping inform the efforts of local, state, and federal education officials to narrow the achievement gap between regular and special education students. These results could provide justification to school boards for hiring more staff, creating and passing building addition referendums, and providing professional development to identify ways to adjust school schedules and reduce class size.

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Dedication

This doctoral study is dedicated to my grandparents, Mr. Anthony Arico Sr. and Mrs. Carmella Arico. Both have been a model of dedication, hard work, and perseverance, which has not only helped mold me to become the man that I am today but also has provided me with the strength I needed to complete this academic journey. This doctoral study and degree are also dedicated to my wife, Jennifer, and our three children, Ty Anthony, Madison Marie, and Trey Christopher. With their unconditional love, support, and confidence I have been able to persevere in accomplishing both my personal and academic goals. The completion of this academic journey is proof to my children that you can do anything you want if you believe in yourself.

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To my son, Ty Anthony, you have been the answer to all of my prayers. I love you with all of my heart, and I want you to succeed much more than me. To my daughter, Madison Marie, you are the most beautiful thing in my life. Your confidence and passion will take you far. I will love you until my heart stops beating. Trey Christopher, you are my buddy! You complete my life and unknowingly provide me with the emotional boost whenever I need it. I will love you forever.

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Lastly, and once more, to my Jennifer, I love you.

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Chapter 1: Introduction to the Study

Introduction

The No Child Left Behind Act (NCLB) of 2001 is based on the principle that setting high academic expectations and establishing measurable goals can improve individual outcomes in education. Under NCLB, states are required to develop assessments in basic skills to be given to all students in certain grades if those states are to receive federal funding for schools. The long-term goal of NCLB is to have all students demonstrate proficiency in reading and mathematics by the 2013-2014 school year (Peterson, 2005). Legislative efforts have also begun to reauthorize the Elementary and Secondary Education Act (ESEA), the precursor to NCLB. President Obama's stated goal is that by 2020 the United States will once more lead the world in college completion (U.S. Department of Education, 2010).

NCLB forbids schools from omitting students with disabilities from the accountability system. The legislation demands participation of all students in statewide accountability assessments and reporting of results for students with disabilities as a disaggregated group (Peterson, 2005). The 1997 Individuals with Disabilities Education Act (IDEA 97) stipulated that students with disabilities be included in state and district assessment programs with appropriate accommodations, where necessary, or with alternate assessments for those who are not able to participate in the general assessment, even with accommodations (Zigmond & Kloo, 2008).

NCLB requires each state to develop and administer annual assessments in Grades 3-8 in reading and math and once during Grades 9-12. States are also required to develop an accountability system that measures adequate yearly progress (AYP). To

make AYP under NCLB, public schools and districts need to meet annual targets for the percentage of students scoring at least at the proficient level on state tests (Olsen, 2005). AYP encompasses an entire student body at a given school. According to Olsen, subgroups, students who speak limited English, are members of racial or ethnic minorities, or have disabilities, are also included. School districts and schools that fail to make AYP toward statewide proficiency goals are subject to corrective action and restructuring measures aimed at getting them back on course to meet state standards (Nagle, Yunker, & Malmgren, 2006).

Hoerr (2008) argued that having standards is vital because without defining normalcy, those who are able to go beyond the standard of normalcy will not be able to showcase those abilities. Standardized tests, then, provide information about a student's performance on a particular topic or skill, as well as information about the effectiveness of the curriculum. According to David (2008), a growing body of evidence suggests that when teachers collaborate to pose and answer questions informed by data from their own students, their knowledge grows and their practice changes. Reeves (2008) argued that educators need to commit to data analysis as a continuous process, not an event. Only when schools can describe reasons for particular outcomes and thereby inform their own teaching and leadership can they move from being encumbered with data to improving professional practice.

Improved professional practice alone, however, may not be enough to raise the scores of special education subgroups. For example, Leahy (2006) found that academic achievement improved in reading, language arts, and math when class size was reduced. Leahy's research was conducted in a school district similar to the one analyzed in the

present study. Leahy found that 100% of the teachers surveyed strongly agreed that larger class sizes contribute to lower student achievement. Jepsen and Rivkin (2009) found that reduced class sizes raised average mathematics and reading achievement by 0.10 and 0.06 standard deviations of a school's average test score distribution. Stevenson (2006) concluded that smaller classes not only enhance academic performance but improve student behavior and teacher morale, and that smaller classes especially benefit at-risk students.

Problem Statement

In the Old Bridge Township School District (OBTSD) in central New Jersey, the special needs population has not been making AYP in accordance with NCLB. Currently, the school district is trying to find new ways to assist special needs students in meeting AYP; but, recent interventions have yielded insufficient improvement. This problem could result in restructuring by the state. Anecdotal evidence suggested that district teachers believe that one barrier to greater pedagogical experimentation is large class sizes. Data from 2006-2009 indicated that average class sizes in eighth-grade inclusion classes were 26 students for social studies, 24 students for science, 21 students for language arts literacy, and 20 students for mathematics. It was hypothesized that lowering class sizes would improve academic performance among special education students.

Purpose of the Study

The purpose of this study was to determine if reduced inclusion class sizes affect student's scores on the New Jersey Assessment of Skills and Knowledge (NJASK) and to solicit teachers' opinions of smaller class sizes. Inclusions classes are those that enroll special needs students.

Research Questions and Hypotheses

I investigated the effect of inclusion class size on academic achievement of special needs students. The study was organized around five research questions and hypotheses.

1. What is the relationship between inclusion class size and special needs students' academic achievement on the NJASK, based on a comparison of the 2008-2009 and 2009-2010 school years?

$H1_a$: A comparison of 2008-2009 and 2009-2010 NJASK test results will reveal that special needs students placed in smaller inclusion classes have higher scores than those special needs students placed in larger inclusion classes.

$H1_0$: A comparison of 2008-2009 and 2009-2010 NJASK test results will reveal that scores of special needs students placed in smaller inclusion classes do not differ significantly from those of special needs students placed in larger inclusion classes.

2. What are 2009-2010 teachers' opinions of smaller class sizes and their effect on student academic achievement?

$H2_a$: Teacher surveys from 2009-1010 will reflect the opinion that special education students placed in smaller classes have higher academic achievement than those students placed in larger classes.

$H2_0$: Teacher surveys from 2009-1010 will reveal no significant differences in teachers' opinions about the effect of class size on special education students' academic achievement.

3. Are 2009-2010 teachers' opinions about how class size affects special education students' academic achievement influenced by teaching experience?

$H3_a$: Teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will differ based on years of teaching experience.

$H3_0$: Teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will not differ based on years of teaching experience.

4. Are 2009-2010 teachers' opinions about how class size affects special education students' academic achievement influenced by number of courses taught per day?

$H4_a$: Teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will differ based on number of courses taught per day.

$H4_0$: Teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will not differ based on number of courses taught per day.

5. Are 2009-2010 teachers' opinions about how class size affects special education students' academic achievement influenced by which subjects are taught?

$H5_a$: Teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will differ based on which subjects are taught.

$H5_0$: Teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will not differ based on which subjects are taught.

Nature of the Study

I used ex post facto research, a "means for testing objective theories by examining the relationship among variables" (Creswell, 2009, p. 4). According to Creswell, the variables used in ex post facto research are subject to statistical measurement. Researchers who employ ex post facto methods test theories deductively, incorporate protections against bias, control for alternative reasoning, and attempt to achieve findings that can be generalized and replicated.

The study consisted of two parts. The first part involved analyzing archival data from the 2008-2009 and 2009-2010 school years at Jonas Salk Middle School (JSMS). I compared eighth-grade special educations students' performance on the NJASK during those 2 academic years to determine the effects of lowered class sizes. The second part involved analyzing JSMS teachers' responses to a specifically designed teacher opinionated questionnaire (see Appendix A). The questionnaire was used to solicit teachers' opinions about the effects of class size on a variety of student behaviors and outcomes.

Significance of the Study

The special education population at JSMS has not made AYP, which means the school has not met the criteria set forth in NCLB. The long-term goal of NCLB is to have all students pass with proficiency in reading and mathematics by the 2013-2014 school year (Peterson, 2005). The present study will be significant not only by testing an intervention for one school but also by creating the potential for curricular and pedagogical improvement throughout education. Results from this study could influence

social change by helping inform the efforts of local, state, and federal education officials to narrow the achievement gap between regular and special education students.

Definition of Terms

Adequate yearly progress (AYP): Proficiency targets for a school as a whole and for student subgroups, including major racial and ethnic groups, economically disadvantaged students, students with disabilities, and students with limited English proficiency (Gill, Lockwood, Martorell, Setodji, & Booker, 2009).

Class size: The number of students assigned to a particular class. According to Horning (2007), a small class is made up of 15 or fewer students. Slavin (1989) defined a large class as being an average of 27 students.

Inclusion: An approach to education based on a commitment to educate special needs students in the school they would ordinarily attend by providing necessary support services. The Special Needs and Disability Act requires teachers, by law, to make reasonable adjustments to their lessons to enable children to learn and be included in school life (Humphrey & Lewis, 2008).

New Jersey Assessment of Skills and Knowledge (NJASK):. The NJASK, a standardized test given to all New Jersey school students in Grades 3-8, is administered by the New Jersey Department of Education (New Jersey Department of Education [NJDE], 2010).

Special education/special needs: Instruction designed to meet the needs of a child with a physical or developmental disability. In this study, the terms special education and special needs will be used interchangeably.

Assumptions

1. Teachers answered the survey questions honestly.

2. NJASK exams were administered, collected, and stored in the proper way.

3. NJASK scores are an accurate reflection of students' academic ability.

Limitations

1. Because this study was based on a single school, results may not be generalizable to other schools or school districts.

2. Because I am an administrator at the middle school that is the site of the proposed study, it is possible my interpretation of test results was affected by insider knowledge.

Delimitations

1. The setting of the study is one of convenience because I am an administrator at the middle school under study.

2. The sample included only eighth-grade special needs students who have taken at least one inclusion class in both seventh and eighth grade.

Theoretical Framework

This study of the effects of class size on special education students' academic achievement was based on social learning, constructivist, and cooperative learning theory. Social learning theory is based on the work of Bandura (1977) and proposes that people learn by observing others. Through observation, one replicates others' behavior, attitudes, and emotional reactions. According to Bandura, "Learning would be

exceedingly laborious, not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do" (as cited in Kearsley, 2009, p. 1).

Constructivism is based on the work of Piaget. According to Lambert et al. (2002), constructivist theory assumes that learners construct meaning based on their previous knowledge, beliefs, and experiences. Constructivists view each learner as a unique individual. In a constructivist classroom, teachers and students are cocreators of knowledge. The teacher is a facilitator rather than a dictator, one who attempts to construct a classroom environment that maximizes the learning potential of each student.

Cooperative learning theory assumes that people learn best when they work in groups rather than individually. Learning is more collaborative than competitive. In a classroom based on cooperative learning principles, individuals perceive that they can attain their goals only if the others with whom they are cooperatively linked attain their goals (Johnson & Johnson, 2009).

According to Wolk (2010), school reform emphasizing standardization has been ineffective. To achieve meaningful change, Wolk argued, schools must be redesigned to meet the needs of individual students. Dewey (2010) stressed that such redesign must be purposeful and informed by the best research, "Whether we permit chance environments to do the work or whether we design environments for the purpose makes a great difference" (p. 22). For Dewey, designing optimal educational environments should take into account the effect of class size on learning. Dewey argued that smaller classes reduce distractions, thus enhancing learning.

Summary

In this chapter, I described a study designed to test the effects of reduced class size on the academic performance of middle school special education students. The study was based on social learning, constructivist, and cooperative learning theory. It involved a comparison of test results between 2 academic years, as well as an assessment of teacher opinion of the efficacy of smaller classes. In chapter 2, I will review the relevant literature on learning theories, special education, and class size. In chapter 3, I will discuss the study's methods, including design, setting, sample, instrumentation, and data collection and analysis procedures. Chapter 4 consists of a summary of results, and in chapter 5 I offer conclusions and recommendations.

Chapter 2: Literature Review

Introduction

In this chapter, I review the relevant literature for a study designed to test the effects of reduced class size on the academic performance of middle school special education students. The number of students with disabilities placed in inclusion settings has increased in recent years (Jameson et al., 2007). In this literature review, I summarize the research on class size and describe five representative class size reduction programs. I also review three influential learning theories: social learning, constructivist, and cooperative learning, as well as several specific pedagogical strategies appropriate for small classes.

The strategy used to acquire the literature was to examine books, dissertations, journal articles, and department of education websites. Searches were performed through Walden University's library database including EBSCO, Education Research Complete, ERIC, and ProQuest databases. Keywords used in the search for relevant literature included *inclusion*, *NCLB*, *special education*, *class size*, *constructivist theory*, *scaffolding*, *problem based learning*, *cooperative learning*, *social learning theory*, *self efficacy*, *anchored instruction*, and *class size studies*.

Class Size

Pedder (2006) argued that educational research should focus on factors that significantly affect the quality of classroom teaching and learning. According to Shin and Chung (2009), class size reduction (CSR) is one of those factors. Smaller classes have been suggested as a solution to low academic achievement (Robertson, 2005). Graue and Rauscher (2009) defined three terms that are important in understanding CSR:

1. Pupil-teacher ratio (PTR): A macroapproach relating expenditures on a per-student basis and determining the number of salaried staff serving a set of pupils.

2. Class size (CS): The number of students in a single classroom.

3. CSR: A focus on specific programs that lower the number of students in a class below a particular threshold. CSR is a specific reform based on changes that are thought to occur between teachers and students in smaller groups.

CSR has been the subject of increasing research interest. In the United States, 25 states have implemented CSR programs, and five states in particular have conducted statewide CSR experiments: Indiana, Tennessee, California, Wisconsin, and Florida (Gilman & Kiger, 2003).

Indiana's CSR program, PRIME TIME, involved reducing the PTR in kindergarten through third grade. PRIME TIME began as a pilot program in 1981 with an aim to improve the quality of the early schooling experience (Shin & Chung, 2009). PRIME TIME dictates that class size average no more than 18 students in Grade 1 and no more than 20 students in Grades 2 and 3. The Indiana State Department of Education conducted two studies on the program's effects on student achievement. The first official study, conducted after the first year PRIME TIME, showed positive results for students in achievement in Grade 1. The second study found no significant results after the third year of PRIME TIME, after students had completed grades 1-3 (Gilman & Kiger, 2003).

Tennessee's CSR project Student-Teacher Achievement Ratio (STAR) was a 4-year, large-scale, randomized study to investigate the effects of small classes on the achievement gap. Schools studied were broadly distributed throughout Tennessee. Participants were 11,000 elementary students in Grades K-3. Achievement was measured

by Stanford Achievement Test (SAT) scores (Konstantopoulos, 2008). Three class types were compared: small (13-17 students), regular (22-26 students), and regular plus a teacher's aide (Finn, Gerber, & Boyd-Zaharias, 2005).

Intervention and control groups in the STAR study were randomly assigned. Intervention was represented by a small class, whereas the control group participated in a regular class or a regular class with a teacher's aide (Konstantopoulos, 2008). Results showed that students placed in small classes performed better than students in the other classes on standardized achievement tests (Wilde & Hollister, 2007). Project STAR produced four main findings:

1. Small classes were associated with superior academic performance in every school subject in every grade during the experiment (K-3) and in every subsequent grade studied (4-8).

2. The academic benefits of smaller classes were greater for students at risk—specifically, minority students, students attending inner-city schools, and students from low-income homes.

3. Students in small classes were more absorbed in learning than were students in larger classes.

4. No significant differences were found between full-size classes with teacher aides and those without teacher aides (Finn et al., 2005, p. 216).

California adopted a CSR policy during the 1996-1997 school year because the state's students ranked near the bottom nationally in both reading and math on the National Assessment of Educational Progress (NAEP; Schrag, 2006). The state provided monetary incentives to reduce class size in the primary grades: a $650 bonus for every

student in grades K-3 when all classes had 20 students or fewer. In 2002-2003, the bonus was increased to $906. Anticipating a lack of classroom space, the state also subsidized the addition of temporary classrooms with payments of $25,000 the first year and $40,000 thereafter (Sims, 2008). These incentives led to high program participation rates; nearly 1.8 million students were in small classes by the end of the 3rd year (Januszka & Dixon-Krauss, 2008). According to Sims, the experiment focused on achieving a certain class size without investigating how class size affects student outcomes.

Wisconsin developed a 5-year CSR project for Grades K-3 called Student Achievement Guarantee in Education (SAGE). According to the Wisconsin Department of Public Education (2010), SAGE was established in the 1996-97 school year to improve student achievement of low-income students by reducing class size. Wisconsin's 449 SAGE schools entered renewable 5-year contracts designed to promote academic achievement through the execution of precise school-improvement strategies. One strategy involved having class sizes of no more than 15 students for one teacher, or 30 students for two teachers or one teacher and a full-time teacher aide. SAGE was reviewed by the Department of Education Policy Research at Arizona State University and the University of Wisconsin-Milwaukee. Reviewers found that the program increased student achievement, upheld gains through third grade, most benefited African Americans, and narrowed the achievement gap between African American and European American students (Iowa State Education Association, 2010).

Florida has widespread limits on class size in elementary and secondary schools (Januszka & Dixon-Krauss, 2008). The state's goal was that by the 2010-2011 school year, class size would be no more than 18 students in prekindergarten through third

grade, 22 students in fourth through eighth grade, and 25 students in ninth through 12th grade (Chingos, 2010). According to the Florida Department of Education (2010), the average class size in major academic classes in Grades 4-8 fell from 24.2 in 2003 to 18.6 in 2009. The decrease in average class size occurred evenly across groups of students defined by race/ethnicity and socioeconomic status, although the decrease was slightly greater for regular education students than for special education students.

Following the introduction of CSR, student achievement in Florida increased, based on NAEP scores of students in fourth grade, with Florida exceeding the national average in reading in 2003 and in math in 2005. According to Chingos (2010),

> Between 1996 and 2009, fourth-grade math scores increased by 0.84 standard deviations, while fourth-grade reading scores increased by 0.39 standard deviations between 1998 and 2009. Over the same time periods, the NAEP scores of eighth-grade students in math and reading increased by 0.39 and 0.26 standard deviations, respectively. Scores on Florida's Comprehensive Assessment Test (FCAT) posted similarly large increases over this period. (p. 5)

These results have been met with criticism from voters in Florida due to the financial burdens created by the class-size amendment (Amendment 8). On October 7, 2010, the Florida State Supreme Court ruled unanimously to keep Amendment 8 on the ballot for the November 2, 2010, election. That amendment failed, and the class-size rules are still in place. The state's teacher union argued that the constitutional amendment did not adequately warn voters that approving it could lead to lower education funding (Larrabee, 2010).

As Chingos (2010) noted, because CSF was not the only new policy enacted in Florida's school system, attributing achievement increases to CSR would be disingenuous. For example, the A-Plus Accountability and School Choice Program began assigning letter grades and related consequences to schools in 1999, and the formula to calculate school grades changed dramatically in 2002 to include student test score gains. Subsequently, Florida initiated several choice programs, including the Opportunity Scholarships program, the McKay Scholarships for Students with Disabilities program, and a corporate tax credit, as well as encouraging a growing number of charter schools. In 2002, Florida began the Just Read, Florida! program, which supplied financial support for reading coaches, diagnostic assessments for districts, and training for educators and parents.

Class Size Effects on Teaching and Learning

Although a variety of researchers have addressed the effects of class size on student achievement, few have distinguished between regular education and special education. Researchers have reported mixed results. One challenge in CSR research is isolating class size as a variable without introducing other variables. Konstantopoulos (2008) evaluated Tennessee's CSR project STAR and reported that average student achievement in small classes (an average of 15 students or fewer) was significantly higher than in regular classes (an average of 22 students or more; p. 276). Konstantopoulos noted that one difficulty in comparing STAR to other CSR efforts is the lack of a national standard for determining what constitutes a small class. Without such a standard, conclusions about the effects of a local program cannot be generalized to the larger student populations.

Slavin (1989) reviewed eight studies on the effects small class sizes have on student achievement. On average, class sizes were reduced from 27 students to 16 students (a 40% reduction). On the whole, effects of CSR were minor: a cumulative median effect size of .13. CSR effects were most noticeable during the first year of an experiment and diminished over time.

Westerlund (2008) studied the effect of class size on 245 student evaluations of an introductory mathematics at Lund University in Sweden. His results indicated that assessments of course quality became more negative as class size increased. The smaller classes Westerlund studied were still comparatively large: 200 students versus 600 students.

Pedder (2006) reviewed the results of two studies: one conducted by Bourke in 1986 and a one by Shapson in 1977 and 1980. Pedder (2006) summarized the studies by exclaiming certain teaching practices, such as increased use of whole-class teaching, fewer student questions seeking help or clarification, more frequent teacher probing, and the availability for longer waiting for pupil responses lead to higher attainments in smaller classes. Pedder (2006) continued by stating, “if students are asked about the issue of class size, they report clearly that class size makes a difference to them” (p. 219).

Pedder (2006) found Bourke’s (1986) study to be useful for demonstrating how class size is entrenched in a network of relationships among variables. Pedder was interested in how class size affects a teacher’s sense of feasible instructional tasks, a concern shared by Blatchford, Russel, Bassett, Brown, and Martin (2007). Blatchford et al. studied the effects of class size on students age 7-11 and found that large classes did not allow teachers sufficient time to pose follow-up or higher-order questions or to

answer all questions thoroughly. Larger classes increase the administrative and procedural burden on teachers and decrease the time they can spend on instruction and addressing students' individual needs. Blatchford et al. found that children in small classes were more likely to interact with their teachers, that more one-to-one teaching took place, that the teacher's main attention was on the children, and that children more often attended to their teachers. CSR positively affected the individual attention students received, teachers' responsiveness to students, the prolonged and fixed nature of interaction between teachers and students, the depth of teachers' knowledge of their students, and compassion for individual children's specific needs. Results of the Blatchford et al. study are summarized in Table 1.

Table 1

Effect of Class Size on Pupil and Teacher Behavior

Outcome variable	Small class observations	Large class observations
Children on task (total)	81%	81%
Child is focus of teacher's attention (short and long)	9%	6%
Individual on task	89%	85%
Individual off task (active)	1%	4%
Individual off task (passive)	8%	11%
Child is focus of teacher's attention (short)	5%	4%
Child is focus teacher's attention (long)	4%	2%

Note. From Blatchford et al. (2007).

As Table 1 shows, in smaller classes pupils are more likely to be on task and to have the teacher's attention. Graue and Oen (2009) made a similar observation and concluded that smaller classes allow students to be more engaged socially and academically, resulting in greater learning. Englehart (2006) interviewed eight middle school teachers and found that their perceptions of student behavior were marginally related to class size.

Blatchford et al. (2007) found that class size affected the amount of teaching. More teacher-to-pupil talk in smaller classes directly addressed subject knowledge than in larger classes. In smaller classes, teachers were better able to recognize difficulties and give feedback, identify exact needs and steer teaching to meet those needs, set individual objectives for pupils, and be flexible in teaching style. Pupils in larger classes were more passive in their interaction with teachers than were their counterparts in smaller classes.

Light (2004), in a qualitative study of 1,600 undergraduate students, revealed that many mentioned the importance of class size in their academic development. In a review article, Horning (2007) noted that in Light's study, student satisfaction with undergraduate education was related to the number of small classes they had taken. When asked to define the term *small*, students cited classes made up of 15 or fewer students. Horning also noted that small classes are more likely to require writing, which improves students' engagement and motivation.

Light (2004) reported on a study by Astin, who found that at the college level a low student-faculty ratio improved student satisfaction with their education and their progress on degrees. Light concluded that small classes enable professors to get to know

their students and to use a greater variety of teaching techniques, including class discussions, than they could in large classes. Horning (2007) noted that in small classes teachers are better able to assess and target students' varying learning styles.

Farrell and Jensen (2002) reviewed the research on class size and reported that smaller classes, by a factor of nearly 9 to 1, showed superior outcomes in student behavior and self-concept. They found that the research on class size reflects three broad areas of agreement: (a) class size affects the educational environment, (b) the relationship between class size and student achievement is indirect (e.g., smaller classes lead to better communication of expectations, to more individual attention to students' interests and needs, and to more student-teacher interaction), and (c) students achieve more in classes of 15 or fewer (p. 316).

Pedder (2006) listed several classroom procedures that are affected by class size: grouping practices, establishing routines, classroom discipline, teacher-pupil interaction, teacher knowledge of children, atmosphere, and special education needs. As class size increases, teachers have less flexibility in choosing from their repertoire of pedagogical skills. Monitoring, checking, and providing suitable feedback are more complicated in larger classes than in smaller classes. In larger classes, more time is needed for nonacademic activities and discipline. Teachers find it more difficult to maintain the necessary pace, depth, and breadth of curriculum coverage as class size increases. In larger classes, unsupervised seatwork increases, with accompanying loss of students' concentration. In smaller classes, teachers share more social talk with students. Finally, students in smaller classes exhibit less off-task behavior.

Class Size Effects in Specific Subjects

Tienken and Achilles (2009) concluded that CSR can influence achievement in specific content areas. Shin and Chung (2009) conducted a fixed-effects categorical analysis of school subjects and class size. They found that student achievement in small classes was better than that of larger classes by .20 standard deviations. The mean effect sizes for social science (.20), math (.20), and reading (.19) were positive. Shin and Chung acknowledged some limitations when generalizing the results of writing and science because those subjects had a small number of effect sizes. Shin and Chung's findings are summarized in Table 2.

Table 2

Effect Sizes by School Subject

Subject	K	Q	*P* value	-95% CI	ES	+95% CI	SE
Reading	58	429.4	< .05	.18	.19	.21	.0055
Writing	1	.0	-	-.28	-.09	.09	.0940
Math	34	114.6	< .05	.19	.20	.21	.0062
Science	2	.9	.3	.09	.15	.20	.0265
Social science	9	26.1	< .05	.18	.20	.23	.0129

Note. K: number of effect sizes. Q: Homogeneity statistic. ES: effect size. SE: standard error. From Shin and Chung (2009).

Din (2010) found that students in smaller classes made greater gains in reading achievement when measured against students in larger classes. In math, students in small

classes performed better in long-term retention. Pedder (2006) found significant class size effects for literacy and mathematics.

Learning Theories

According to Khalid, Darussalam, Begawan, and Darussalam (2007), "Educators worldwide often pay too much attention to students' achievement and too little attention to learning environments" (p. 127). Simply reducing class size is not likely to be effective unless it is accompanied by a thoughtful revision of teaching strategies. Such rethinking should take into account theories of learning and teaching techniques that are appropriate for small classes (Graue, Hatch, Rao, & Oen, 2007). In this section, I discuss several such theories and classroom practices.

Social Learning Theory

Bandura's (1977) social learning theory is based on the assumption that people learn by replicating the behaviors, attitudes, and emotional reactions of others. By observing other people perform the skills, rather than just through personal experience children acquire a vast array of skills (Bellini & Akullian, 2007). Without the influence of others in the learning process, Bandura (1977) argued, learning can become boring and tiresome.

According to Bandura (1977), social learning theory explains human behavior as a continuous reciprocal interaction among cognitive, behavioral, and environmental factors. From its first entry into the world, the infant observes and studies all that is going on around. Soon, the infant begins to model others' behavior. "Modeling influences produce learning principally through their informative function" (Bandura, 1977, p. 24). Bandura characterized observational learning as consisting of attention, retention, motor

reproduction, and motivation. Attention begins when certain behaviors become prevalent and the sensory capacities of the observer are aroused. Retention occurs when both symbolic and motor rehearsals become organized cognitively. Motor reproduction focuses on accuracy of feedback, whereas motivation pertains to self-reinforcement. Bellini and Akullian (2007) noted that children attend most closely to those who are similar to themselves in some way.

Another important component of social learning theory is self-efficacy: belief in one's ability to manage and implement the courses of action required to handle prospective situations. Efficacy beliefs determine how people think, feel, motivate themselves, and act. They influence effort, persistence, and choice of activities (Zimmerman, 1999). Zimmerman found that "modeling and didactic forms of arithmetic instruction increased students self-efficacy beliefs, persistence during the posttest, and acquisition of arithmetic skills in students who were very low achievers in mathematics" (p. 204). The effect of self-efficacy on skill acquisition is both cognitive and motivational, concluded Zimmerman. The dynamics of self-efficacy are illustrated in

Figure 1.

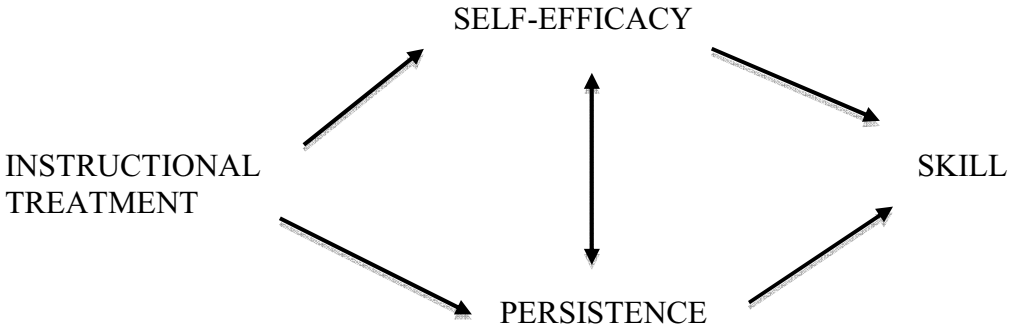

Figure 1. Effects of instructional treatment, self-efficacy, and persistence on academic performance.

Note. Adapted from Schunk (1984) and used by permission.

Cooperative Learning

One application of social learning theory is cooperative learning. Here the assumption is that children learn through interaction, so a curriculum should be designed to emphasize interaction between learners and learning tasks (Doolittle, 1997). Cooperative Learning is the instructional use of small groups so that students work together to maximize their own and each other's learning (Johnson, Johnson, and Holubec (2008). For Laverie (2006), "Cooperative learning is a structured and focused instructional strategy in which small groups work toward a common goal" (p. 60). Pelech and Pieper (2010) described cooperative learning as a strategy in which a small group of students share knowledge, complete projects or assignments, or master a body of knowledge (p. 51).

Pelech and Pieper (2010) listed five characteristics of cooperative learning: positive interdependence, face-to-face interaction, individual accountability, interpersonal

skills, and group processing. Positive interdependence results when students are given tasks that can be finished only if all group members contribute; it involves achieving both personal and group goals. Face-to-face interaction consists of group members encouraging each other, providing feedback, exchanging ideas and resources, and adapting to each other. Individual accountability means all group members are accountable for whatever the group achieves. While working with others to modify and expand each other's knowledge base, students learn to share ideas, resolve apparent cognitive disconnects, and resolve personal conflicts through interpersonal skills. Finally, students are given time to reflect on the learning process through group processing.

For low achievers, cooperative learning activities have positive effects, as they can receive attention from the other group mates and help from more experienced peers (Servetti, 2010). Servetti's meta-analysis of studies on cooperative learning revealed that working together results in higher achievement scores and better retention, fosters interpersonal and cognitive skills, facilitates constructive conflict resolution, and promotes social responsibility and mutual respect. Tuan (2010) made a similar observation, stating that cooperative learning enhances cognitive growth, motivation, self-confidence, achievement, and willingness to interact.

Whereas Servetti (2010) claimed that cooperative learning especially benefits low achievers, Johnson et al. (2008) touted its advantages for all learners: high, medium, and low achievers. They also claimed that cooperative learning enhances psychological health by creating a social support system. The social support system consists of others who share a person's tasks and goals and provide resources that enhance the individual's well-being and help the individual mobilize his or her resources to deal with challenging and

stressful situations (Johnson et al., 2008). Social support can be both academic and personal.

> To face adversity and deal with challenge, individuals need the support of significant others who share the person's goals. Social support is provided when these significant others show emotional concern for the person's well-being and success, give aid that is instrumental in the person's success, provide information that helps the person succeed, and give feedback that helps the person improve and refine actions that lead to success. (Johnson et al., 2008, p. 12)

Johnson et al. (2008) listed five reasons for incorporating cooperative learning in classrooms:

1. Attitudes are changed in groups, not individual by individual. Teachers should use small groups to persuade students of the value of education.

2. Attitudes are changed as a result of small group discussions that lead to public commitment.

3. Messages from individuals who care about and are committed to the student are taken more seriously than messages from indifferent others.

4. Personally tailored appeals are more effective than general messages. The individuals best able to construct an effective personal appeal are peers who know the student well.

5. Support from caring and committed peers is essential for modifying attitudes and maintaining the new attitudes.

Constructivist Theory

Constructivism is based on the principle that learners construct meaning based on their previous knowledge, beliefs, and experiences (Lambert et al., 2002). Constructivism fosters objective reasoning, self-inquiry, and critical openness (Kumar, 2006). Boghossian (2006) argued that there is no knowledge independent of the meaning attributed to the constructed experience by the learner and that constructing knowledge means being an active participant in the learning process. According to Gijbels, Van De Watering, Dochy, and Van Den Bossche (2006), incorporating constructivist principles leads to more cooperative learning communities and more meaningful knowledge construction. DeVries (2002) found that children educated according to constructivist principles scored at or above the national average in both reading and mathematics on the SAT.

Constructivists believe that students should be given the opportunity to share their previous knowledge and experiences. Students who share their experiences with fellow classmates enhance their own learning by providing purpose, creating comprehension, and fostering understanding through their explanations. Students who have not had particular experiences described by fellow classmates will be able to participate in those experiences vicariously.

According to Schweitzer and Stephenson (2008), constructivists view peer-to-peer relations as essential to learning. These interactions support democratic and nonhierarchical decision making and endorse a classroom environment in which participants learn to see their peers as possible resources rather than seeking knowledge from the instructor alone. Rather than an independently determined or subject driven

schedule or agenda, within a constructivist classroom, learner needs and progress set the tone, as well as the pace and content of learning (Schweitzer & Stephenson, 2008). An individual's perception of the content's relevance to their experiences and values creates learning (Schweitzer & Stephenson, 2008).

Scaffolding

A specific teaching technique consistent with constructivism is scaffolding, a structured support strategy. Valkenburg (2010) described scaffolding as being like the support structures one sees next to a building that construction workers use while completing various tasks. Once those tasks are finished, the scaffolding is removed.

The first step of scaffolding is for the teacher to develop curiosity and engage students. Once students are actively involved, a given task should be broken into subtasks. The teacher then models various ways of completing tasks, which learners can imitate and eventually internalize (Preston & Vogel, 2006). Scaffolding, like constructivism in general, involves building on skills and experiences one already has (Lambert et al., 2002). According to Lambert et al., an "organism encounters new experiences and events and seeks to assimilate these existing cognitive structures or to adjust the structures to accommodate the new information" (p. 7).

Anchored Instruction/Problem-Based Learning

Anchored instruction, or problem-based learning (PBL), has become increasingly popular in K-12 classrooms (Hung, Jonassen, & Liu, 2008). In PBL, students engage in a bona fide role while exploring real-world problems that have been specifically designed to foster active engagement in learning (Van Berkel & Dolmans, 2006). In confronting real-world problems, students begin to recognize gaps in their knowledge. They must

then find the information needed to solve the problem and eventually form solutions. PBL is an inquiry process that resolves questions, curiosities, doubts, and uncertainties about complex phenomena in life (Barell, 2007). It is "an instructional (and curricular) learner-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem" (Savery, 2006, p. 12). PBL is based on the assumption that learners will experience cognitive dissonance upon exposure to a problem scenario and that solutions will be proposed that lessen this dissonance (Kumar & Kogut, 2006).

PBL helps students take ownership of a problem and become actively involved in generating a solution. PBL facilitates differentiated instruction—for example, designing learning tasks that engage auditory learners as well as visual learners. PBL encourages students to use all their senses. Teachers who use PBL encourage students to investigate various possibilities, create alternative solutions, work together with other students, try out ideas and hypotheses, revise their thinking, and present their best solutions. PBL improves critical thinking, communication, mutual respect, teamwork, and interpersonal skills. It enhances students' ability to metacognitively, motivationally, and behaviorly participate in the learning process (Sungar & Tekkaya, 2006).

According to Barell (2007), because PBL helps students examine experiences from multiple viewpoints, it lends itself to interdisciplinary instruction. BPB, claimed Barell, presents students "with challenges to encounter a complex situation, to engage in analysis, information gathering, critical thinking about findings, and drawing reasonable solutions" (p. 5). Barell listed eight advantages of PBL:

1. Processing information at higher levels—such as with problem solving, critical thinking, inquiry strategies, and reflection on practice—leads to deeper understanding.

2. Authentic pedagogy involves knowledge construction, disciplined inquiry, and connections beyond school that result in higher student achievement.

3. Intellectual and pedagogical processes normally involved in problem-based learning include comparing/contrasting, summarizing, nonlinguistic representations, cooperative learning, generating and testing hypothesis, and questioning.

4. High levels of intellectual challenge and social interaction can be highly motivating.

5. PBL is inquiry and choice driven, providing opportunities to think and make choices with peers.

6. During PBL students engage knowledge, skills, and attitudes in many and varied contexts, rather than sitting and listening to information.

7. Some students with learning difficulties are challenged toward more lively and alternative engagements with and responses to content when they have opportunities to make some decisions about what and how to learn on their own.

8. Inquiry-as-a-thread can be a way of integrating all instructional and curricular processes.

Summary

In this chapter, I reviewed the relevant research for a study of the effect that CSR has on educational achievement. I summarized research on the effects of class size on teaching and learning at the elementary, secondary, and postsecondary level. It also considered the effects of CSR in specific subject areas. The review concluded with a

description of learning theories and classroom strategies appropriate to smaller classes. In chapter 3, I will describe the study's design, setting, population, sample, instrumentation, and data collection and analysis procedures. In chapter 4, I will summarize the study's results, and in chapter 5, I will offer conclusions and recommendations.

Chapter 3: Methodology

Introduction

The purpose of this ex post facto study was to determine if inclusion class size affects scores on the NJASK and to discover teacher opinions about the effects of class size. In this chapter, I will describe the proposed study's design, setting, population and sample, instrumentation, and data collection and analysis procedures.

Research Questions and Hypotheses

The study was organized around five research questions and hypotheses, which are stated below in alternative and null form:

1. What is the relationship between inclusion class size and special needs students' academic achievement on the NJASK, based on a comparison of the 2008-2009 school year and the 2009-2010 school year?

$H1_a$: A comparison of 2008-2009 and 2009-2010 NJASK test results will reveal that special needs students placed in smaller inclusion classes have higher scores than those special needs students placed in larger inclusion classes.

$H1_0$: A comparison of 2008-2009 and 2009-2010 NJASK test results will reveal that scores of special needs students placed in smaller inclusion classes do not differ significantly from those of special needs students placed in larger inclusion classes.

2. What are 2009-2010 teachers' opinions of smaller class sizes and their effect on student academic achievement?

$H2_a$: Teacher surveys from 2009-1010 will reflect the opinion that special education students placed in smaller classes have higher academic achievement than those students placed in larger classes.

$H2_0$: Teacher surveys from 2009-1010 will reveal no significant differences in teachers' opinions about the effect of class size on special education students' academic achievement.

3. Are 2009-2010 teachers' opinions about how class size affects special education students' academic achievement influenced by teaching experience?

$H3_a$: Teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will differ based on years of teaching experience.

$H3_0$: Teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will not differ based on years of teaching experience.

4. Are 2009-2010 teachers' opinions about how class size affects special education students' academic achievement influenced by number of courses taught per day?

$H4_a$: Teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will differ based on number of courses taught per day.

$H4_0$: Teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will not differ based on number of courses taught per day.

5. Are 2009-2010 teachers' opinions about how class size affects special education students' academic achievement influenced by which subjects are taught?

$H5_a$: Teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will differ based on which subjects are taught.

$H5_0$: Teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will not differ based on which subjects are taught.

Design

This study is an example of ex post facto research in that it used archival data: results of middle school students' performance on a statewide assessment—the NJASK. Creswell (2009) noted that ex post facto studies provide a "means for testing objective theories by examining the relationship among variables" (p. 4). Researchers who employ expost facto research test theories deductively, thus constructing protections against bias and controlling for alternative reasoning, ultimately resulting in the ability to generalize and replicate findings. I used a survey of my own construction (see Appendix A) that was designed to elicit teachers' opinions about the effects of class size on instruction and student performance.

Setting, Population, and Sample

The setting for the study was a central New Jersey middle school (Grades 6-8) in need of improvement under NCLB because its special needs population has not made AYP in language arts and mathematics. The population consisted of 90 special needs students who were instructed in inclusion classes from 2008 to 2010 and all teachers at the school. From that population, a purposeful sample was selected. The student sample consisted of 39 special needs students who were placed in large classes (16 or more students) in seventh grade and small classes (15 or fewer students) in eighth grade. They

were compared to a purposeful sample of general education students who were selected based on test score. The teacher sample consisted of 89 certified teachers: 45 in general education, 16 in special education, 11 in the arts, seven in physical education, five in foreign languages, and four in basic skills.

One threat to the internal validity of this study is that students were not selected randomly, and the selected students had characteristics that may have predisposed them to be affected differently. Selection of eighth-grade general education inclusion students was based on NJASK scores. Only those scoring in the 2-11-210 range were selected. The rationale for this limitation was a desire to have general education students of average ability for the special education inclusion students to model. External validity of the study was jeopardized by the narrow characteristics of participants, which limits generalizability of results.

Instrumentation

NJASK

In 1996, the New Jersey State Board of Education (NJSBE) adopted the New Jersey Core Curriculum Content Standards (CCCS), a framework for educational reform in the state's public schools. Since the adoption of those standards, NJSBE has engaged in discussions with educators, business representatives, and national experts about the impact of the standards on classroom practices. Sufficient depiction of the content domains defined in the CCCS is guaranteed through use of a test blueprint and an approved test-construction process. New Jersey performance standards, as well as the CCCS, are taken into consideration in writing multiple-choice and constructed-response items and rubrics. Each test must align with and appropriately represent the subdomains

of the test blueprint. NJSBE has approved the NJASK exam as a valid pre- and posttest for individual students, subgroups, and students as a whole.

Because the NJASK assesses student performance in several content areas using a variety of testing methods, it is important to determine the relationship between content areas and testing methods. The NJASK exam is scaled in several ways: raw score points, item response theory, and performance standard level. New Jersey promotes the use of performance level results, reporting them annually on each content test at the student, school, district, and state level. Test results are reported for students as a whole as well as by student group: sex, ethnicity, disability, English language proficiency, migrant status, and district factor group. NJASK performance scores indicate whether an individual student performs at the partially proficient, proficient, or advanced proficient level in a content area.

In a repeated-measures study, a systematic difference between scores in the first treatment condition and scores in the second treatment condition are the basis for analysis (Gravetter & Wallnau, 2008). Reliable student test scores are consistent in the NJASK exam. Specifically, measurement components are reliable with each other. Results of the components vary; but, they do so within acceptable limits. Measurement error and reliability are inversely related. When measurement error is large, reliability is small. Increasing reliability by minimizing measurement error is an important goal in the construction of any test. The NJASK assessments were designed under the assumptions of classical test theory, a method that seeks perfect, error-free, or true measurement score. Any observed measurement is defined as a combination of true score and its associated error.

Class Size Questionnaire

Under the direction of the OBTSD and a Walden University faculty member, I created a 15-item questionnaire to investigate teacher opinion on class size (see Appendix A). The questionnaire uses a 4-point multiple rating scale scale: 1 = strongly agree, 2 = tend to agree, 3 = tend to disagree, and 4 = strongly disagree. The questionnaire also solicited background information on the teachers participating in the study. Because the questionnaire had not previously been used, it has not been subject to reliability or validity testing.

Data Collection

Research Question 1

Research question 1 was addressed using archived data consisting of NJASK test results. Data represented two groups: (a) special education inclusion students who were in a large class (≥ 16) during the 2008-2009 school year and in a small class (< 16) in 2009-2010, and (b) general education students scoring in the proficient range (211-219) on the 2008-2009 NJASK exam. The archived data were stored in a locked location in the district's Special Services office and were released when I received IRB approval, which is approval number 06-08-11-0144205.

Research Questions 2-5

A questionnaire of my own design (see Appendix A) was administered to the entire teaching staff of JSMS under the auspices of the school district. Teachers chose whether to participate in the study. Questionnaire results were released to me when I received IRB approval and are stored in a locked file in my office.

Data Analysis

NJASK data were analyzed with a paired-samples *t* test using SPSS software. Descriptive statistics (mean, standard deviation, standard error) were computed for each set of scores (mean, number of scores, standard deviation, and standard error for the mean).

For this question, teacher opinion was the dependent variable and class size was the independent variable. An independent *t* test was performed to answer research question 2.

Simple linear regression (SLR) was conducted to analyze research question 3. SLR is typically conducted with continuous variables. Here, teacher opinion was the dependent variable and teaching experience was the independent variable. A teacher opinion measure was obtained by summing items 1, 3, 4, 5, 6, 7, 11, 12, 13, and 15 of the Class Size Questionnaire. Teaching experience was represented by number of years taught, as revealed in the background information section of the questionnaire.

SLR was conducted to analyze research question 4, with teacher opinion as the dependent variable and number of subjects taught as the independent variable. A teacher opinion measure was obtained by summing items 1, 3, 4, 5, 6, 7, 11, 12, 13, and 15 of the Class Size Questionnaire. Number of subjects taught was obtained from question 3 in the background information section of the questionnaire.

Analysis of variance (ANOVA) was conducted to analyze research question 5. Whereas SLR is used for continuous independent variables, ANOVA reveals whether different independent variables have equal effects on the dependent variable when the

independent variables are categorical. Teacher opinion—a sum of items 1, 3, 4, 5, 6, 7, 11, 12, 13, and 15 on the Class Size Questionnaire—was the dependent variable, and the independent variable was specific subject(s) taught, obtained from question 4 in the background information section of the questionnaire.

Summary

In this chapter, I described the methods for an ex post facto study designed to determine if reducing inclusion class size affects student's scores on the NJASK exam, and to determine teachers' opinions of smaller class sizes. This chapter included descriptions of the research design, setting, population, sample, and data collection and data analysis procedures. In chapter 4, I will summarize the study's results. In chapter 5, I will present conclusions and recommendations.

Chapter 4: Results

Introduction

The purpose of this ex post facto study was to determine if inclusion class size affects scores on the NJASK and to discover teacher opinions about the effects of class size. In this chapter, I will summarize the study's results by reporting descriptive statistics and the results of *t* tests, SLR, and ANOVA.

The study addressed five questions:

1. What is the relationship between inclusion class size and special needs students' academic achievement on the NJASK, based on a comparison of the 2008-2009 and 2009-2010 school years?

2. What are teachers' opinions of smaller class sizes and their effect on student academic achievement?

3. Are teachers' opinions about how class size affects special education students' academic achievement influenced by teaching experience?

4. Are teachers' opinions about how class size affects special education students' academic achievement influenced by number of courses taught per day?

5. Are teachers' opinions about how class size affects special education students' academic achievement influenced by which subjects are taught?

Descriptive Statistics

The study had 78 valid participants, with two missing values (see Table 3). Tables 4-7 are frequency tables summarizing background information of the sample. Table 8 lists summary statistics for the teacher questionnaire.

Table 3

Participants in the Study

		b1 How long have you taught in the education system?	b2 Have you always taught middle school students throughout your career?	b3 Do you teach more than one subject on a daily basis?	b4_r b4 recode
N	Valid	78	78	78	78
	Missing	2	2	2	2

Table 3 shows that 80 teachers took the teacher questionnaire and two did not respond. Table 4 summarizes how long the individual teachers have taught in the education system and shows that teaching experience is distributed fairly evenly across categories.

Table 4

How Long Have You Taught in the Education System?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 1-5 years	19	23.8	24.4	24.4
	2 6-10 years	16	20.0	20.5	44.9
	3 11-15 years	18	22.5	23.1	67.9
	4 16-20 years	6	7.5	7.7	75.6
	5 over 20 years	19	23.8	24.4	100.0
	Total	78	97.5	100.0	
Missing	System	2	2.5		
Total		80	100.0		

Table 5 shows the frequencies for whether teachers have always taught middle school students throughout their career. The majority of teachers answered the question affirmatively.

Table 5

Have You Always Taught Middle School Students Throughout Your Career?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 yes	42	52.5	53.8	53.8
	2 no	36	45.0	46.2	100.0
	Total	78	97.5	100.0	
Missing	System	2	2.5		
Total		80	100.0		

Table 6 shows that about two thirds of participating teachers teach only one subject a day. Table 7 shows which subjects participants teach.

Table 6

Do You Teach More Than One Subject On a Daily Basis?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 yes	25	31.3	32.1	32.1
	2 no	53	66.3	67.9	100.0
	Total	78	97.5	100.0	
Missing	System	2	2.5		
Total		80	100.0		

In interpreting Table 7, it should be noted that although only one participant listed his or her subject as special education, most special education teachers teach more than one subject. Combining the special education and multiple subject categories would yield a total of 18 special education teachers (23.1%).

Table 7

What Subject(s) Do You Teach?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00 Math	9	11.3	11.5	11.5
	2.00 LAL	13	16.3	16.7	28.2
	3.00 Science	8	10.0	10.3	38.5
	4.00 Social studies	8	10.0	10.3	48.7
	5.00 Special ed.	1	1.3	1.3	50.0
	6.00 Related arts	11	13.8	14.1	64.1
	7.00 Physical ed.	7	8.8	9.0	73.1
	8.00 Foreign lang.	4	5.0	5.1	78.2
	99999.00 Multiple subjects	17	21.3	21.8	100.0
	Total	78	97.5	100.0	
Missing	System	2	2.5		
Total		80	100.0		

Table 8 shows summary statistics for the teacher questionnaire. The large standard deviations indicate that teacher's opinions varied widely.

Table 8

Summary Statistics for the Teacher Opinion Questionnaire

	N	Minimum	Maximum	Mean	Std. Deviation
q1 Larger class sizes contribute to a decrease in student achievement	77	1	4	1.77	.793
q2 Classes of smaller size have less discipline problems	77	1	4	1.99	.716
q3 Smaller class sizes afford the opportunity for more individualized instruction	78	1	2	1.28	.453
q4 Smaller classes allow more time for teachers to spend on subject specific skills	78	1	3	1.53	.639
q6 Smaller classes can increase student achievement	78	1	4	1.62	.669
q7 Smaller class sizes lead to improved achievement in reading	75	1	3	1.81	.586
q8 Smaller class sizes lead to increased student self-efficacy	78	1	4	1.92	.660
q9 Smaller class sizes lead to increased special needs student self-efficacy within the classroom	78	1	4	1.74	.673
q10 Smaller class sizes facilitates more positive teacher-student interactions	78	1	3	1.54	.638
q11 Special needs students placed within inclusion classes of smaller size have an increase in academic motivation	77	1	4	1.90	.736
q12 Smaller class sizes provide teachers to get to know the strengths and weaknesses of their special needs students better	78	1	3	1.29	.486
q13 Smaller class sizes provide teachers to get to know the strengths and weaknesses of their students better	77	1	3	1.32	.524
q14 Smaller class sizes provide an increased sense of belonging for special needs inclusion students with their general education student counterparts	77	1	4	1.86	.702
q15 Inclusion classes of a smaller class size facilitates a better learning atmosphere	77	1	3	1.61	.652
Valid *N* (list wise)	72				

Research Question 1

The first question asked whether there is a relationship between inclusion class size and special needs students' academic achievement on the NJASK, based on a comparison of the 2008-2009 and 2009-2010 school years. The null hypothesis for this question was: A comparison of 2008-2009 and 2009-2010 NJASK test results will reveal that scores of special needs students placed in smaller inclusion classes do not differ significantly from those of special needs students placed in larger inclusion classes. NJASK data were analyzed with a paired-samples *t* test. Descriptive statistics (mean, standard deviation, standard error) were computed for each set of scores. Table 9 shows these findings.

Table 9

Descriptive Statistics for NJASK Scores

MANOVA test criteria and exact F statistics for the hypothesis of no overall intercept effect

Statistic	Value	F Value	Num DF	Den DF	Pr > F
Wilks' Lambda	0.53879165	14.55	2	34	<.0001
Pillai's Trace	0.46120835	14.55	2	34	<.0001
Hotelling-Lawley Trace	0.85600502	14.55	2	34	<.0001
Roy's Greatest Root	0.85600502	14.55	2	34	<.0001

Note. H = Type III SSCP matrix for intercept. E = Error SSCP matrix. S = 1, M = 0, N = 16.

As Table 9 illustrates, based on a comparison of NJASK test results for the two years, the null hypothesis can be rejected: $F(2,34) = 14.55$, $p < 0.0001$. In other words, special needs students' scores on 2008-09 state standardized test differed significantly from 2009-2010 scores, suggesting that class size made a difference in academic achievement.

Research Question 2

The second research question asked whether teachers would connect smaller class size to academic achievement. The null hypothesis for this question was: Teacher surveys from 2009-1010 will reveal no significant differences in teachers' opinions about the effect of class size on special education students' academic achievement. With teacher opinion being the dependent variable and class size the independent variable, an independent *t* test was performed. Gravetter and Wallnau (2008) noted, "The goal of an independent measures research study is to evaluate the mean difference between two populations (or between two treatment conditions)" (p. 259). For this analysis, the average response for question 1 was tested against the neutral value. Table 10 illustrates the findings.

Table 10

Teachers' Opinions of Smaller Class Size Effect on Academic Achievement

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
q1 Larger class sizes contribute to a decrease in student achievement	-13.652	76	.000	-1.234	-1.41	-1.05

The statistical test for the second research question measured whether the average response was significantly different from neutral (3). Results show that teachers believed that students placed in smaller classes would have higher academic achievement than students in larger classes.

Research Question 3

The third research question asked whether teachers' opinions about class size effects on special education students' academic achievement are influenced by teaching experience. The null hypothesis for this question was: Teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will not differ based on years of teaching experience.

An SLR was conducted to analyze research question 3. SLR is typically conducted with continuous variables. The goal for the regression is to find the best-fitting line for a set of data (Gravetter & Wallnau , 2008). SLR fits a straight line through a set

of points, with differences between the sample and the estimated function value as small as possible. Here, teacher opinion was the dependent variable and teaching experience was the independent variable. A teacher opinion measure was obtained by summing items 1, 3, 4, 5, 6, 7, 11, 12, 13, and 15 of the Class Size Questionnaire. Teaching experience was represented by number of years taught, as revealed in the background information section of the questionnaire. Table 11 illustrates the findings.

Table 11

SLR of Teacher Opinion and Teaching Experience

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.583	1	6.583	.499	.482(a)
	Residual	923.361	70	13.191		
	Total	929.944	71			

a Predictors: (Constant) How long have you taught in the education system?
b Dependent variable: Teacher opinion

As Table 11 shows, with *p* value of 0.482, results were not significant, thus confirming the null hypothesis: Teachers' opinions of smaller class size and its effect on student academic achievement do not differ based on years taught.

Research Question 4

The fourth question of this study addressed whether 2009-2010 teachers' opinions about class size effects on special education students' academic achievement are influenced by the number of courses taught per day. The null hypothesis for this question was: Teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will not differ based on number of courses taught per day.

An SLR was conducted to analyze research question 4, with teacher opinion as the dependent variable and number of subjects taught as the independent variable. A teacher opinion measure was obtained by summing items 1, 3, 4, 5, 6, 7, 11, 12, 13, and 15 of the Class Size Questionnaire. Number of subjects taught was obtained from question 3 in the background information section of the questionnaire. Table 12 illustrates the findings.

Table 12

SLR of Teacher Opinion and Number of Subjects Taught

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.778	1	2.778	.210	.648(a)
	Residual	927.167	70	13.245		
	Total	929.944	71			

a Predictors: (Constant), b3 Do you teach more than one subject on a daily basis?
b Dependent variable: teacher opinion

For research question 4, results were not significant, with a p value of 0.648. It can thus be concluded that teachers' opinions of class size effect on student academic achievement do not differ due to the number of subjects taught.

Research Question 5

The fifth research question asked whether teachers' opinions about class size effects on special education students' academic achievement are influenced by which subjects are taught. The null hypothesis for this question was: Teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will not differ based on which subjects are taught.

An ANOVA was conducted to analyze research question 5. Whereas SLR is used for continuous independent variables, ANOVA reveals whether different independent

variables have equal effects on the dependent variable when the independent variables are categorical. To avoid the problems that arise from using different groups of participants, a repeated-measures design was used. A repeated-measures design uses the same group of participants in all treatment conditions so that it is impossible for one group to be different from another because exactly the same group is used in every treatment condition (Gravetter & Wallnau, 2008). Teacher opinion, a sum of items 1, 3, 4, 5, 6, 7, 11, 12, 13, and 15 on the Class Size Questionnaire, was the dependent variable, and the independent variable was specific subject(s) taught, obtained from question 4 in the background information section of the questionnaire. Table 13 illustrates the findings.

Table 13

SLR of Teacher Opinion and Specific Subject(s) Taught

Teacher Opinion

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	135.251	8	16.906	1.340	.241
Within Groups	794.694	63	12.614		
Total	929.944	71			

For research question five, results were not significant, with a *p* value of 0.241. It can thus be concluded that teachers' opinions of class size effect on student academic achievement do not differ due to the subject(s) taught.

Conclusion

Five research questions were explored in this study. The first question asked whether there a relationship between inclusion class size and special needs students' academic achievement on the NJASK, based on a comparison of the 2008-2009 and 2009-2010 school years. The null hypothesis was rejected. Special needs students' academic achievement on the state standardized test, collected from archived data, differed significantly between 2008-2009 and 2009-2010, when class sizes were smaller.

The second question addressed teachers' opinions class size effect on academic achievement. Results showed that teachers believed that students in smaller classes would have higher academic achievement than students placed in larger classes.

The third question addressed whether teachers' opinions about class size effects on academic achievement are influenced by teaching experience. Results showed that opinions about class size effects on academic achievement did not differ based on teaching experience.

The fourth question addressed whether teachers' opinions about class size effects on academic achievement are influenced by number of courses taught per day. Results showed that teachers' opinions did not differ based on number of courses taught.

The fifth question asked whether teachers' opinions about class size effects on academic achievement are influenced by which subjects are taught. Results showed that teachers' opinions did not differ due to the subject one teaches.

As a result, two out of the five hypotheses were accepted, while three of the five hypotheses were rejected. The two hypotheses that were accepted were: a comparison of

2008-2009 and 2009-2010 NJASK test results will reveal that special needs students placed in smaller inclusion classes have higher scores than those special needs students placed in larger inclusion classes, and teacher surveys from 2009-1010 will reflect the opinion that special education students placed in smaller classes have higher academic achievement than those students placed in larger classes. The three hypotheses that were rejected were: teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will differ based on years of teaching experience, teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will differ based on number of courses taught per day, and teacher surveys from 2009-1010 about the effect of class size on special education students' academic achievement will differ based on which subjects are taught.

The next chapter includes a summary of the study and conclusions based on the results detailed in chapter 4. Social change implications are discussed and suggestions for future research are offered.

Chapter 5: Discussion, Conclusion, and Recommendations

Overview

This chapter includes a summary of the study based on results described in chapter 4, a discussion of the findings, conclusions drawn from the study, and recommendations for future action and research on the effect of class size on inclusion student academic success. In the OBTSD in central New Jersey, the special needs population has not been making AYP in accordance with NCLB. To make adequate progress under NCLB, public schools and districts need to meet annual targets for the percentage of students scoring at least at the proficient level on state tests (Olsen, 2005). With recent interventions yielding insufficient improvement, the school district is trying to find new ways to help special needs students meet AYP. Anecdotal evidence suggested that district teachers believe that one barrier to greater pedagogical experimentation is large class sizes. As a result, the purpose of this study was to determine if reduced inclusion class size would affect student's scores on the NJASK and to solicit teachers' opinions about smaller class size.

The study addressed five research questions. Statistical analysis included paired-sample *t* tests, simple linear regression, and analysis of variance.

1. What is the relationship between inclusion class size and special needs students' academic achievement on the NJASK, based on a comparison of the 2008-2009 and 2009-2010 school years?

2. What are 2009-2010 teachers' opinions of smaller class sizes and their effect on student academic achievement?

3. Are 2009-2010 teachers' opinions about how class size affects special education students' academic achievement influenced by teaching experience?

4. Are 2009-2010 teachers' opinions about how class size affects special education students' academic achievement influenced by number of courses taught per day?

5. Are 2009-2010 teachers' opinions about how class size affects special education students' academic achievement influenced by which subjects are taught?

Summary of Findings

Two of the five hypotheses for this study were confirmed: that class size affects academic achievement for special needs students, and that teachers think such is the case. The first question asked whether there a relationship between inclusion class size and special needs students' academic achievement on the NJASK, based on a comparison of the 2008-2009 and 2009-2010 school years. The null hypothesis was rejected. Special needs students' academic achievement on the state standardized test, collected from archived data, differed significantly between 2008-2009 and 2009-2010, when class sizes were smaller. The second question addressed teachers' opinions class size effect on academic achievement. Results showed that teachers believed that students in smaller classes would have higher academic achievement than students placed in larger classes. The third question addressed whether teachers' opinions about class size effects on academic achievement are influenced by teaching experience. Results showed that opinions about class size effects on academic achievement did not differ based on teaching experience. The fourth question addressed whether teachers' opinions about class size effects on academic achievement are influenced by number of courses taught

per day. Results showed that teachers' opinions did not differ based on number of courses taught. The fifth question asked whether teachers' opinions about class size effects on academic achievement are influenced by which subjects are taught. Results showed that teachers' opinions did not differ due to the subject one teaches.

These results support Robertson's (2005) claim that smaller classes are a solution to low academic achievement. The results are also consistent with those achieved by Shin and Chung (2009), who conducted a fixed-effects categorical analysis of school subjects and class size and found that student achievement in small classes was better than that in larger classes by .20 standard deviations. Hypotheses that teachers' opinions are influenced by teaching experience, number of courses taught daily, or which courses are taught were not confirmed by the present study.

Implications for Social Change

With the long-term goal of NCLB being that all students demonstrate proficiency in reading and mathematics by the 2013-2014 school year (Peterson, 2005), this study is significant not only by testing an intervention for one school but also by creating the potential for curricular and pedagogical improvement throughout education. Pedder (2006) argued that educational research should focus on factors that significantly affect the quality of classroom teaching and learning. According to Shin and Chung (2009), CSR is one of those factors. Smaller classes have been suggested as a solution to low academic achievement (Robertson, 2005). Results from this study could influence social change by helping inform the efforts of local, state, and federal education officials to narrow the achievement gap between regular and special education students. These results could provide justification to school boards for hiring more staff, creating and

passing building addition referendums, and providing professional development to identify ways to adjust school schedules and reduce class size. IDEA 97 stipulated that students with disabilities be included in state and district-wide assessment programs with appropriate accommodations, where necessary (Zigmond & Kloo, 2008). Results of this study can help schools and school districts comply with IDEA 97.

As the benefits of small classes become more widely known, more school districts are likely to take steps to create this optimum learning environment, and more teachers will be able to adopt strategies that maximize that environment. These developments will increase special needs students' self-efficacy. More confident students placed in a more active position in their learning environment will have a positive effect not only on their individual achievement but on the larger academic environment and school culture.

Recommendations for Action

Based on the literature review and the results of this study, several recommendations can be made to improve special needs students' academic achievement. These recommendations could be disseminated to local school boards via each district's Instructional Council, whose charge is to identify ways that instruction can be improved. Results from this study on the effect of small classes on special needs students' academic achievement are consistent with those reported by Konstantopoulos (2008), who evaluated Tennessee's CSR project STAR, where average student achievement in small classes (an average of 15 students or fewer) was significantly higher than in regular classes (an average of 22 students or more). Konstantopoulos noted that one difficulty in comparing STAR to other CSR efforts is the lack of a national standard for determining what constitutes a small class. Without such a standard, conclusions about the effects of a

local program cannot be generalized to larger student populations. One recommendation, therefore, is that a national standard be created whereby classes considered small contain 15 students or fewer.

Administrators should be provided professional development to identify ways to adjust school master schedules to allow for more small classes. Such development opportunities would not create a financial burden. As a third recommendation, school districts should survey both teachers and students regarding class size. Students who have been in both large and small classes could be polled and the results compared. Finally, school districts should provide professional support for business administrators on accounting, tax auditing, and law. Such training could help business administrators find ways to hire additional staff and accommodate the space needs generated by increasing the number of classes in a building. By creating a standard for labeling class size, soliciting teacher and student opinion about the effects of class size, and providing professional development for administrative staff, school districts may discover the rationale and means to create more small classes for special needs students and thus improve their test scores.

Recommendations for Further Study

The purpose of this study was to determine if reduced inclusion class sizes affect students' scores on the NJASK and to solicit teachers' opinions about smaller classes. Although the results of the study showed a correlation between reduced inclusion class size and student academic success, as well as positive opinions by teachers on smaller class sizes, there still is a need for further research. Such research could address the effect of class size reduction on the test performance of general education students in New

Jersey. Studies could also assess the effect of reduced class size on other measures of academic achievement besides test scores.

Conclusion

This study confirmed that teachers' beliefs in the efficacy of small classes are well-founded. The purpose of the study was not to suggest specific ways to reduce class size but to provide a rationale for efforts to do so. The study was designed to encourage state governments and local school districts to think strategically about how to reduce class size, both for specific subgroups such as special education, and for the general student population. The result of such efforts could be improvement on standardized tests and compliance with the AYP requirements of NCLB.

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Appendix A: Class Size Survey

Background Information

Directions: Circle the appropriate answer.

1. How long have you taught in the education system?

   1-5 years 6-10 years 11-15 years 16-20 years Over 20 years

2. Have you always taught middle school students throughout your career?

   Yes No

3. Do you teach more than one subject on a daily basis?

   Yes No

4. What subject(s) do you teach?

   Math L.A.L. Science Social Studies Special Education

   Related Arts Physical Education Foreign Language

Opinion Questionnaire

Directions: Read each statement and circle the response that you agree with most. There are no right or wrong answers.

*Large (Regular) classes consist of 18-25 students.
*Small classes consist of 13-17 students.
*Special needs means students who have an Individualized Education Plan.

	Strongly agree	Tend to agree	Tend to disagree	Strongly disagree
1. Larger class sizes contribute to a decrease in student achievement.	[ ]	[ ]	[ ]	[ ]
2. Classes of smaller size have less discipline problems.	[ ]	[ ]	[ ]	[ ]
3. Smaller class sizes afford the opportunity for more individualized instruction.	[ ]	[ ]	[ ]	[ ]
4. Smaller classes allow more time for teachers to spend on subject specific skills.	[ ]	[ ]	[ ]	[ ]
6. Smaller classes can increase student achievement.	[ ]	[ ]	[ ]	[ ]
7. Smaller class sizes lead to improved achievement in reading.	[ ]	[ ]	[ ]	[ ]
8. Smaller class sizes lead to increased student self-efficacy.	[ ]	[ ]	[ ]	[ ]
9. Smaller class sizes lead to increased special needs student self-efficacy within the classroom.	[ ]	[ ]	[ ]	[ ]
10. Smaller class sizes facilitates more positive teacher-student interactions.	[ ]	[ ]	[ ]	[ ]
11. Special needs students placed within inclusion classes of smaller size have an increase in academic motivation.	[ ]	[ ]	[ ]	[ ]
12. Smaller class sizes provide teachers to get to know the strengths and weaknesses of their special needs students better.	[ ]	[ ]	[ ]	[ ]
13. Smaller class sizes provide teachers to get to know the strengths and weaknesses of their students better.	[ ]	[ ]	[ ]	[ ]
14. Smaller class sizes provide an increased sense of belonging for special needs inclusion students with their general education student counterparts.	[ ]	[ ]	[ ]	[ ]
15. Inclusion classes of a smaller class size facilitates a better learning atmosphere.	[ ]	[ ]	[ ]	[ ]

Curriculum Vitae

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QUALIFICATIONS

A professional leader, with strong interpersonal communication skills, who demonstrates the ability to manage and evaluate staff, fosters innovative curriculum development, and ensures the social and emotional growth of each student while implementing district policies and procedures.

EXPERTISE

-Scheduling	-Character Education Program	-Spec. Ed./AYP Dev. Prog.
-RealTime	-504 Implementation	-BSI Scheduling
-HQT	-Staff Evaluations	-M.S. Hrs Criteria/Program
-Busing	-Parent Communication	-Servant Leadership

SUMMARY OF KEY ACCOMPLISHMENTS

- Developed and facilitated new Special Education Delivery Program in order to assist the special needs subgroup in making adequate yearly progress.
- Provided and supported both middle schools with their master scheduling by becoming fluent with the RealTime application. Assisted Assistant Business Administrator on implementation and facilitation of Realtime within the middle schools.
- Established Middle School Honors scheduling and assisted in developing program criteria for both middle schools.
- Generated flexibility within special education staff assignments and scheduling by facilitating all special education teachers at Jonas Salk in becoming highly qualified in all subjects.
- Co-created Middle School Character Education Program, as well as Anti-Bullying Program entitled “Project Respect”.
- Have studied and put into practice transformational leadership style, which has assisted in creating a positive well-rounded school culture and environment.

PROFESSIONAL EXPERIENCE

VICE PRINCIPAL
JONAS SALK MIDDLE SCHOOL, Old Bridge, New Jersey 7/06-Present

- Responsible for the daily structural flow of Jonas Salk Middle School.
- Observed staff members teaching, wrote observation reports, and conducted appropriate conferences.
- Facilitated staff and supervised hundreds of students.
- Conducted 504 meetings and ensured all accommodations were being met.
- Created State Testing schedules, exam schedules, and miscellaneous schedules for various school events.
- Met with parents, teachers, and students to discuss discipline procedures and/or parent concerns.
- Completed and allocated budget, as well as itinerary for Fairview trip.

TEACHER
JONAS SALK MIDDLE SCHOOL, Old Bridge, New Jersey 9/00-6/06

EDUCATION
DEGREES

Ed.D. DOCTOR OF EDUCATION January 2012
WALDEN UNIVERSITY, Minneapolis, Minnesota

M.S.E.D. EDUCATIONAL LEADERSHIP May, 2002
MONMOUTH UNIVERSITY, West Long Branch, New Jersey

M.A.T./EDUCATION May, 2000
MONMOUTH UNIVERSITY, West Long Branch, New Jersey

BACHELOR OF SCIENCE – **JOURNALIS**M December, 1997
WEST VIRGINIA UNIVERSITY, Morgantown, West Virginia

CERTIFICATIONS

PRINCIPAL CERTIFICATION May, 2002
MONMOUTH UNIVERSITY, West Long Branch, New Jersey

SUPERVISION CERTIFICATION May, 2002
MONMOUTH UNIVERSITY, West Long Branch, New Jersey

SPECIAL EDUCATION CERTIFICATION June, 2001
MONMOUTH UNIVERSITY, West Long Branch, New Jersey